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1 Pixel merging for object-parallel rendering: a distributed snooping algorithm ◼
Michael Cox, Pat Hanrahan
November 1993 **Proceedings of the 1993 symposium on Parallel rendering**
Full text available: 📄 pdf(2.05 MB)   Additional Information: full citation, references, citings, index terms

Keywords: cache coherency, object-parallel rendering, pixel merging, snoopy cache

2 Hybrid volume and polygon rendering with cube hardware ◼
Kevin Kreeger, Arie Kaufman
July 1999 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**
Full text available: 📄 pdf(1.85 MB)   Additional Information: full citation, references, citings, index terms

Keywords: cube architecture, mixing polygons and volumes, ray casting, run-length-encoding, volume rendering

3 Performance issues of a distributed frame buffer on a multicomputer ◼
Bin Wei, Douglas W. Clark, Edward W. Felten, Kai Li, Gordon Stoll
August 1998 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**
Full text available: 📄 pdf(1.63 MB)   Additional Information: full citation, references, citings, index terms

Keywords: multi-port distributed frame buffer, multicomputers, parallel rendering, synchronization

4 The triangle processor and normal vector shader: a VLSI system for high performance ◼
graphics
Michael Deering, Stephanie Winner, Bic Schediwy, Chris Duffy, Neil Hunt

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June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques,** Volume 22 Issue 4

Full text available: pdf(2.29 MB)   Additional Information: full citation, abstract, references, citings, index terms

Current affordable architectures for high-speed display of shaded 3D objects operate orders of magnitude too slowly. Recent advances in floating point chip technology have outpaced polygon fill time, making the memory access bottleneck between the drawing processor and the frame buffer the most significant factor to be accelerated. Massively parallel VLSI system have the potential to bypass this bottleneck, but to date only at very high cost. We describe a new more affordable VLSI solution. A pi ...

Keywords: graphics VLSI, hardware lighting models, interpolation, real-time image display, shading, triangle processor

5 Visualizing information spaces: Automatic graphical abstraction in intent-based 3D-illustrations

Antonio Krüger

May 1998 **Proceedings of the working conference on Advanced visual interfaces**

Full text available: pdf(1.47 MB)   Additional Information: full citation, abstract, references, citings

The purpose of this paper is to present models, methods and techniques to control automatically the degree of details in graphics or animation in an intelligent way. Instead of just aiming at the technical advantages of such a reduction (i.e. saving computer memory and computational load), this work focuses on clarifying the intention of graphics or animation with the means of abstraction. The goal is to direct the viewer's attention to relevant parts of the graphics, without using metaobjects o ...

6 Theory and application of specular path perturbation

Min Chen, James Arvo

October 2000 **ACM Transactions on Graphics (TOG),** Volume 19 Issue 4

Full text available: pdf(280.67 KB)   Additional Information: full citation, abstract, references, index terms

In this paper we apply perturbation methods to the problem of computing specular reflections in curved surfaces. The key idea is to generate families of closely related optical paths by expanding a given path into a high-dimensional Taylor series. Our path perturbation method is based on closed-form expressions for linear and higher-order approximations of ray paths, which are derived using Fermat's Variation Principle and the Implicit Function Theorem (IFT). The perturbation formula presen ...

Keywords: Taylor series, implicit surfaces, optics, perturbation theory, specular reflection

7 A ray-slice-sweep volume rendering engine

Ingmar Bitter, Arie Kaufman

August 1997 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: pdf(1.09 MB)   Additional Information: full citation, references, citings, index terms

Keywords: compositing, gradient estimation, hardware design, perspective projection, volume rendering architecture, volume visualization

8 SIGGRAPH'91 Workshop Report Integrating Computer Graphics, Computer Vision,

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and Image Processing in Scientific Applications
Ingrid Carlbom, Indranil Chakravarty, William M. Hsu
January 1992 **ACM SIGGRAPH Computer Graphics**, Volume 26 Issue 1
Full text available: pdf(1.28 MB)   Additional Information: full citation, citings, index terms

9 The design of a parallel graphics interface
Homan Igehy, Gordon Stoll, Pat Hanrahan
July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**
Full text available: pdf(389.52 KB)   Additional Information: full citation, references, citings, index terms

10 Z3: an economical hardware technique for high-quality antialiasing and transparency
Norman P. Jouppi, Chun-Fa Chang
July 1999 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**
Full text available: pdf(1.61 MB)   Additional Information: full citation, references, citings, index terms

Keywords: A-buffer, anti-aliasing, supersampling, transparency

11 Steerable interactive television: virtual reality technology changes user interfaces of viewers and of program producers
Ronald Pose
January 2001 **Australian Computer Science Communications , Proceedings of the 2nd Australasian conference on User interface**, Volume 23 Issue 5
Full text available: pdf(919.44 KB)
                        Additional Information: full citation, abstract, references
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Television has traditionally been a passive medium from the viewer's perspective. The viewer sits in front of the television receiver and passively absorbs what is presented. On the other hand immersive virtual reality systems engage the user and bring the user into the virtual world, often as a participant rather than just as an observer. This paper looks at applying virtual reality display technology, the Address Recalculation Pipeline, to the familiar technology of television. In so doing it ...

12 Extending graphics hardware for occlusion queries in OpenGL
Dirk Bartz, Michael Meißner, Tobias Hüttner
August 1998 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**
Full text available: pdf(953.96 KB)   Additional Information: full citation, references, citings, index terms

Keywords: OpenGL, hierarchical data structures, occlusion culling, visibility

13 Load balancing for multi-projector rendering systems
Rudrajit Samanta, Jiannan Zheng, Thomas Funkhouser, Kai Li, Jaswinder Pal Singh
July 1999 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: 🔁 pdf(1.79 MB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Keywords: cluster computing, immersive display systems, load balancing, parallel rendering

14 <u>Hardware accelerated rendering of antialiasing using a modified a-buffer algorithm</u>

Stephanie Winner, Mike Kelley, Brent Pease, Bill Rivard, Alex Yen
August 1997 **Proceedings of the 24th annual conference on Computer graphics and interactive techniques**
Full text available: 🔁 pdf(113.06 KB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Keywords: antialiasing, image partitioning, plane equation evaluation, scanline, texture mapping, transparency

15 <u>Graphics rendering architecture for a high performance desktop workstation</u>

Chandlee B. Harrell, Farhad Fouladi
September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**
Full text available: 🔁 pdf(346.15 KB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

16 <u>Imaging features in advanced graphics architectures (panel)</u>

Bob Murphy
August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**
Full text available: 🔁 pdf(16.53 KB)   Additional Information: <u>full citation</u>, <u>index terms</u>

17 <u>The rendering architecture of the DN10000VS</u>

David Kirk, Douglas Voorhies
September 1990 **ACM SIGGRAPH Computer Graphics , Proceedings of the 17th annual conference on Computer graphics and interactive techniques,** Volume 24 Issue 4
Full text available: 🔁 pdf(4.07 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

The Appollo DN10000VS treats graphics as an integral part of the system architecture. Graphics requirements influence the entire system design. All floating-point computations for graphics are performed by the CPU(s), while rasterizing is handled by simplified hardware having no microcode. We decided to support alpha buffering, quadratic interpolation, and texture mapping directly in hardware. This partitioning reduces the cost of a high-end workstation, without sacrificing high rendering qualit ...

18 <u>Leo: a system for cost effective 3D shaded graphics</u>

Michael F. Deering, Scott R. Nelson
September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**
Full text available: 🔁 pdf(241.27 KB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Keywords: 3D graphics hardware, antialiased lines, floating-point microprocessors, gouraud shading, parallel graphics algorithms, rendering

19 Design of a high performance volume visualization system

Barthold Lichtenbelt

August 1997 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: pdf(1.11 MB)   Additional Information: full citation, references, citings, index terms

Keywords: OpenGL, system design, visualization, volume accelerator, volume rendering

20 Combatting rendering latency

Marc Olano, Jon Cohen, Mark Mine, Gary Bishop

April 1995 **Proceedings of the 1995 symposium on Interactive 3D graphics**

Full text available: pdf(2.97 MB)   Additional Information: full citation, abstract, references, citings, index terms

Latency or lag in an interactive graphics system is the delay between user input and displayed output. We have found latency and the apparent bobbing and swimming of objects that it produces to be a serious problem for head-mounted display (HMD) and augmented reality applications. At UNC, we have been investigating a number of ways to reduce latency; we present two of these. Slats is an experimental rendering system for our Pixel-Planes 5 graphics machine guaranteeing a constant single NTSC ...

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21 A display system for the Stellar graphics supercomputer model GS1000   ◼
Brian Apgar, Bret Bersack, Abraham Mammen
June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques,** Volume 22 Issue 4

Full text available: 🔲 pdf(826.23 KB)   Additional Information: full citation, abstract, references, citings, index terms

This paper describes a high performance display system that has been incorporated into the overall architecture of the Stellar Graphics Supercomputer Model GS1000. The display system is tightly coupled to the CPU, memory system and vector processing unit of this supercomputer, and is capable of rendering 150,000 shaded triangles/sec, and 600,000 short vectors/sec. The goal of the architecture is to share hardware resources between the CPU and display system and achieve a high bandwidth connectio ...

22 Scalable distributed visualization using off-the-shelf components   ◼
Alan Heirich, Laurent Moll
October 1999 **Proceedings of the 1999 IEEE symposium on Parallel visualization and graphics**

Full text available: 🔲 pdf(1.81 MB)   Additional Information: full citation, abstract, references, citings, index terms

This paper describes a visualization architecture for scalable computer systems. The architecture is currently being prototyped for use in Beowulf-class clustered systems. A set of OpenGL frame buffers are driven in parallel by a set of CPUs. The visualization architecture merges the contents of these frame buffers by user-programmable associative and commulative combining operations. The system hardware is built from off-the-shelf components including OpenGL accelerators, Field Programmabl ...

Keywords: Beowulf, FPGA, OpenGL, cluster, fat-tree, gigabit, visualization

23 VC-1: a scalable graphics computer with virtual local frame buffers   ◼
Satoshi Nishimura, Tosiyasu L. Kunii
August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: 🔲 pdf(266.19 KB)   Additional Information: full citation, references, index terms

Keywords: demand paging, frame buffers, parallel polygon rendering, scalable

24 The digital Michelangelo project: 3D scanning of large statues

Marc Levoy, Kari Pulli, Brian Curless, Szymon Rusinkiewicz, David Koller, Lucas Pereira, Matt Ginzton, Sean Anderson, James Davis, Jeremy Ginsberg, Jonathan Shade, Duane Fulk

July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available: 📄 pdf(10.83 MB)   Additional Information: full citation, abstract, references, citings, index terms

We describe a hardware and software system for digitizing the shape and color of large fragile objects under non-laboratory conditions. Our system employs laser triangulation rangefinders, laser time-of-flight rangefinders, digital still cameras, and a suite of software for acquiring, aligning, merging, and viewing scanned data. As a demonstration of this system, we digitized 10 statues by Michelangelo, including the well-known figure of David, two building interiors, and all 1,163 extant f ...

Keywords: 3D scanning, cultural heritage, graphics systems, mesh generation, range images, rangefinding, reflectance and shading models, sensor fusion

25 A shading language on graphics hardware: the pixelflow shading system

Marc Olano, Anselmo Lastra

July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**

Full text available: 📄 pdf(238.26 KB)   Additional Information: full citation, references, citings, index terms

Keywords: procedural shading, real-time image generation, shading language

26 Single-pass full-screen hardware accelerated antialiasing

Jin-Aeon Lee, Lee-Sup Kim

August 2000 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: 📄 pdf(8.82 MB)   Additional Information: full citation, references, citings, index terms

Keywords: antialiasing, graphics hardware, parallel computing, rendering hardware

27 A MIMD rendering algorithm for distributed memory architectures

Thomas W. Crockett, Tobias Orloff

November 1993 **Proceedings of the 1993 symposium on Parallel rendering**

Full text available: 📄 pdf(1.16 MB)   Additional Information: full citation, references, citings, index terms

Keywords: asynchronous algorithms, multiprocessors, parallel polygon rendering, performance analysis

28

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Pomegranate: a fully scalable graphics architecture
Matthew Eldridge, Homan Igehy, Pat Hanrahan
July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(508.39 KB)   Additional Information: full citation, abstract, references, citings, index terms

Pomegranate is a parallel hardware architecture for polygon rendering that provides scalable input bandwidth, triangle rate, pixel rate, texture memory and display bandwidth while maintaining an immediate-mode interface. The basic unit of scalability is a single graphics pipeline, and up to 64 such units may be combined. Pomegranate's scalability is achieved with a novel "sort-everywhere" architecture that distributes work in a balanced fashion at every stage of the pipeline, ke ...

Keywords: graphics hardware, parallel computing

29 FRAMES: Software tools for modeling, rendering and animation of 3D scenes
Michael Potmesil, Eric M. Hoffert
August 1987 **ACM SIGGRAPH Computer Graphics , Proceedings of the 14th annual conference on Computer graphics and interactive techniques,** Volume 21 Issue 4

Full text available: pdf(3.61 MB)   Additional Information: full citation, abstract, references, citings, index terms

FRAMES is a set of flexible software tools, developed for the UNIX programming environment, that can be used to generate images and animation of 3D scenes. In FRAMES, each stage of the image-rendering pipeline is assigned to a UNIX System filter. The following is a typical FRAMES pipe sequence where each filter performs a task implied by its name:cat scene.frm|euclid|mover|shade|camera|abufFRAMES was designed to be easy to use, to permit flexible experimentation with new ideas in image rendering ...

30 Multiperspective panoramas for cel animation
Daniel N. Wood, Adam Finkelstein, John F. Hughes, Craig E. Thayer, David H. Salesin
August 1997 **Proceedings of the 24th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(4.43 MB)   Additional Information: full citation, references, citings, index terms

Keywords: CGI production, compositing, illustration, image-based rendering, mosaics, multiplaning, non-photorealistic rendering

31 Talisman: commodity realtime 3D graphics for the PC
Jay Torborg, James T. Kajiya
August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: pdf(107.48 KB)   Additional Information: full citation, references, citings, index terms

32 Polygon rendering on a stream architecture
John D. Owens, William J. Dally, Ujval J. Kapasi, Scott Rixner, Peter Mattson, Ben Mowery
August 2000 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: Additional Information: full citation, abstract, references, citings, index

pdf(161.65 KB)   terms

The use of a programmable stream architecture in polygon rendering provides a powerful mechanism to address the high performance needs of today's complex scenes as well as the need for flexibility and programmability in the polygon rendering pipeline. We describe how a polygon rendering pipeline maps into data streams and kernels that operate on streams, and how this mapping is used to implement the polgyon rendering pipeline on Imagine, a programmable stream processor. We compare our resul ...

Keywords: OpenGL, SIMD, graphics hardware, kernels, media processors, polygon rendering, stream architecture, stream processing, streams

33 GI-cube: an architecture for volumetric global illumination and rendering

Frank Dachille, Arie Kaufman
August 2000 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: pdf(650.91 KB)   Additional Information: full citation, abstract, references, citings, index terms

The power and utility of volume rendering is increased by global illumination. We present a hardware architecture, GI-Cube, designed to accelerate volume rendering, empower volumetric global illumination, and enable a host of ray-based volumetric processing. The algorithm reorders ray processing based on a partitioning of the volume. A cache enables efficient processing of coherent rays within a hardware pipeline. We study the flexibility and performance of this new architecture using both ...

Keywords: hardware accelerator, volume processing, volume rendering, volumetric global illumination, volumetric ray tracing

34 FBRAM: a new form of memory optimized for 3D graphics

Michael F. Deering, Stephen A. Schlapp, Michael G. Lavelle
July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**

Full text available: pdf(67.48 KB)   Additional Information: full citation, abstract, references, citings, index terms
ps(157.07 KB)

FBRAM, a new form of dynamic random access memory that greatly accelerates the rendering of Z-buffered primitives, is presented. Two key concepts make this acceleration possible. The first is to convert the read-modify-write Z-buffer compare and RGB&agr; blend into a single write only operation. The second is to support two levels of rectangularly shaped pixel caches internal to the memory chip. The result is a 10 megabit part that, for 3D graphics, performs read-modify-write cycles ten tim ...

Keywords: 3D graphics hardware, caching, dynamic memory, parallel graphics algorithms, rendering

35 Three-dimensional medical imaging: algorithms and computer systems

M. R. Stytz, G. Frieder, O. Frieder
December 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 4

Full text available: pdf(7.38 MB)   Additional Information: full citation, references, citings, index terms, review

Keywords: Computer graphics, medical imaging, surface rendering, three-dimensional

imaging, volume rendering

36 Cube-4—a scalable architecture for real-time volume rendering
Hanspeter Pfister, Arie Kaufman
October 1996 **Proceedings of the 1996 symposium on Volume visualization**
Full text available: pdf(2.68 MB)   Additional Information: full citation, references, citings, index terms

37 InfiniteReality: a real-time graphics system
John S. Montrym, Daniel R. Baum, David L. Dignam, Christopher J. Migdal
August 1997 **Proceedings of the 24th annual conference on Computer graphics and interactive techniques**
Full text available: pdf(697.27 KB)   Additional Information: full citation, references, citings, index terms

38 Interactive playing with large synthetic environments
Bruce F. Naylor
April 1995 **Proceedings of the 1995 symposium on Interactive 3D graphics**
Full text available: pdf(4.35 MB)   Additional Information: full citation, references, index terms

39 Fast data parallel polygon rendering
F. A. Ortega, C. D. Hansen, J. P. Ahrens
December 1993 **Proceedings of the 1993 ACM/IEEE conference on Supercomputing**
Full text available: pdf(1.65 MB)   Additional Information: full citation, references, citings, index terms

40 Optimized geometry compression for real-time rendering
Mike M. Chow
October 1997 **Proceedings of the 8th conference on Visualization '97**
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